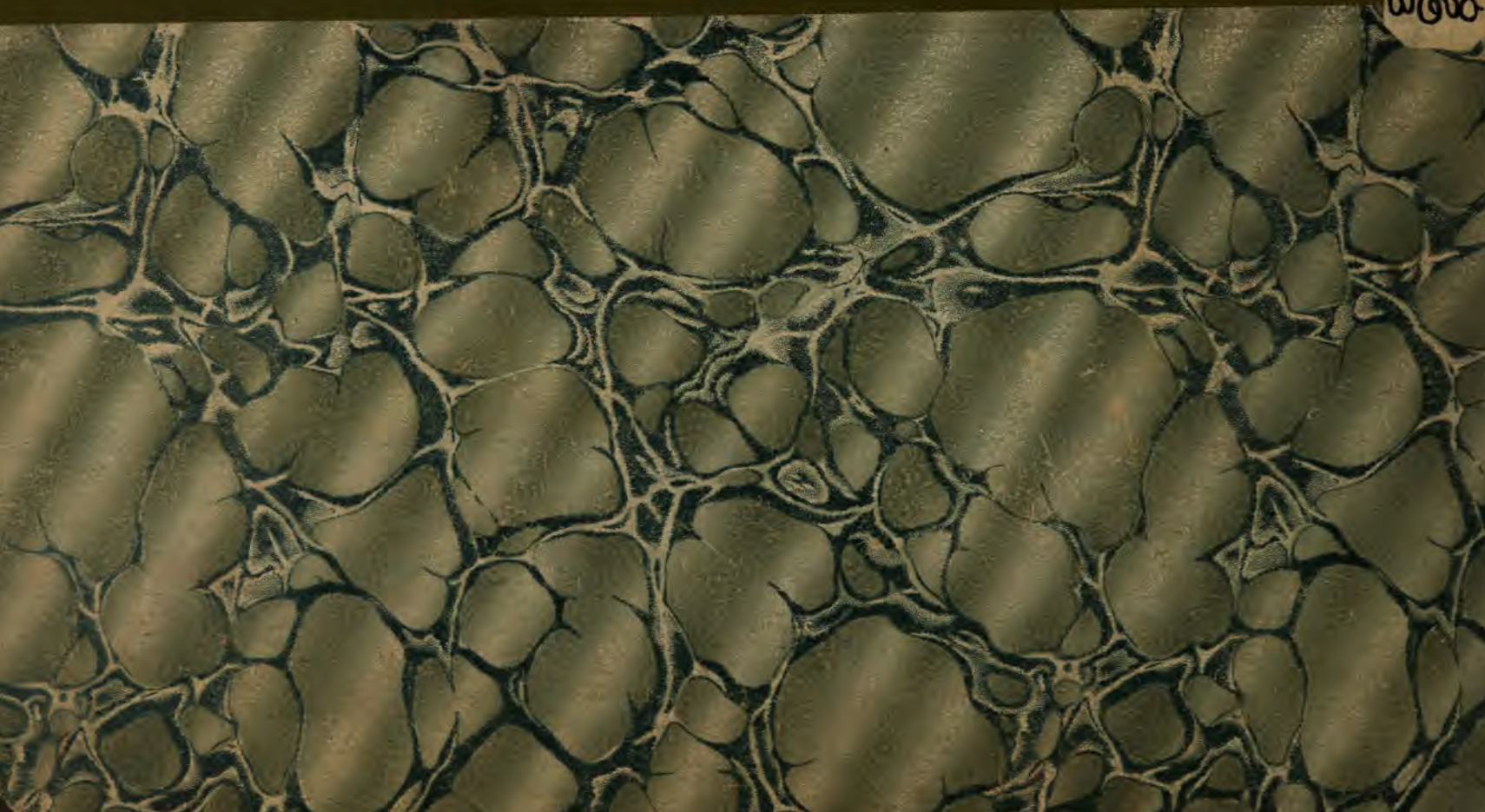
Prevention of Fire in Boston - 1911.



The Prevention of Fire in Boston

Report of the
Committee on Fire Prevention
of the
Boston Chamber of Commerce

Boston, Mass.
September, 1911

INTRODUCTORY NOTE.

The Committee on Fire Prevention of the Boston Chamber of Commerce was appointed August 25th, 1910, with instructions to prepare and submit to the Board of Directors a report on conditions in Boston relating to fire hazard and losses, with recommendations as to the best method to follow in improving these conditions.

In carrying out these instructions, the committee has conferred with a number of persons qualified to advise in reference to the various phases of the question—representatives of the Boston Board of Fire Underwriters, Associated Factory Mutual Insurance Company and of the Boston Finance Commission, members of the Fire Hazard Commission appointed by the Mayor of Boston, with the Building Commissioner, the Fire Commissioner, and others. The committee has also studied the reports of various insurance companies, national and local boards of fire underwriters, the Fire Protective Association, state commissions, the Geological Survey, and others. Figures compiled from these reports appear in the appendices.

EXISTING CONDITIONS.

It is a remarkable feature of American civilization that the loss of property due to fire in the United States is $250,000,000 a year, about $2.50 for every man, woman and child in the country. This is seven times the average per capita loss in European countries. It amounts to one-fourth as much as the value of new construction. We burn down quarter as much as we build up.

Not less remarkable is the complacency with which the public views this destruction. Even though the seriousness of the situation is repeatedly brought to the attention of the public by the daily press and by reports of insurance organizations, the average citizen seems well content to let things go on as they are, without making any move toward improvement.

It is hard to understand how this attitude can prevail, when it is so clear to one who devotes a moment's thought, that the fire waste is a real and irretrievable loss, the destruction of property reducing by just so much the aggregate wealth of the community. This loss falls upon every member of the community in the form of increased taxes, increased insurance rates, increased cost of building materials, increased rent, and, sooner or later, may fall upon any one in the more obvious form of direct personal loss due to a fire in his own home or place of business.

Furthermore, the money loss by no means represents the real cost of fire. The consequential loss due to sacrifice of lives, damage to business and homes, interruption of employment for many persons, and to general derangement of civic functions is so large that one dare not try to estimate it. It surely represents several times the actual property loss, thus carrying the total cost of fire into the billions.

The comparison of per capita losses in this country and Europe, as shown in Appendix I.—$2.50 in the United States, 33

cents in Europe—is so startling that it suggests a study of the relative conditions to see if the methods which prevail in foreign countries could be introduced here. An investigation of foreign conditions as compared with those in this country brings out that:

The building construction is much better on the average, and in some cities practically all buildings are of fireproof construction.

Building laws are more rigidly enforced, and frequent inspections are made.

A well organized fire marshal system exists in practically every city, and the causes of all fires are investigated. A fire is considered a crime and the guilty punished, resulting in much greater individual responsibility.

The fire departments in foreign countries are certainly no better than ours, and probably on the average not as good. The preventive measures mentioned above are the fundamental reasons for freedom from fire waste.

In foreign countries conflagrations are practically unknown, while in this country they are very common. The reason for this condition is, of course, the large amount of wood construction used in this country. Even in our large cities where fireproof buildings have become general, there are still in existence groups of buildings which on the interior are largely constructed of wood. These so-called second class buildings make possible a conflagration at any time. Such a holocaust as has been experienced by Elizabeth, Chelsea, Baltimore, San Francisco, Portland, and Bangor may be expected in Boston at any time.

The number of deaths due to fire is also out of all reasonable proportion in this country, over 6000 people having lost their lives in one year. The loss of life in foreign countries is small. All rules and regulations which tend toward the reduction of fire waste will, of course, reduce this loss of life. Recent experiences in this country, particularly the fire of April 7th, 1911, New York City, show an utter disregard for law and reasonable conditions of safety.

Further, it is important to realize that in this country in manufacturing buildings which are insured in the mutual companies preventive measures have been introduced most successfully, and that

the loss by fire in this field is reduced to a remarkably low point. Some figures have been compiled in this connection and are given in Appendix II. This is a very important consideration, since it is practically conclusive proof that fire waste in this country can be reduced, provided the proper regulations are enforced.

The reduction of fire losses will mean not only a direct saving of property and life, but a corresponding reduction in the cost of insurance to every policy holder. In order to prevent a loss by fire from falling upon one individual the present system of fire insurance has been developed, through which a tax in the form of premiums is levied and a fund established to reimburse the individual sufferer. It is evident that the amount of this premium must be proportional to the total fire loss, and must in addition cover the cost of services and guarantee of the insurance companies. Each individual thus feels the fire loss directly through the amount of his insurance premiums. Reliable statistics regarding the profits of insurance companies bear out the fact that no reduction in the average premium can be expected without a reduction in the fire loss. (See Appendix III.)

RECOMMENDATIONS.

This Committee, after giving consideration to the above facts regarding fire waste, submits the following recommendations:

I.

To reduce the construction hazard:—

(a) The enactment of city ordinances which shall prohibit the construction of any third class building within the city limits.

(b) The enactment of a law prohibiting the construction of any but fireproof buildings within the congested business district of the city.*

(c) The passage of a law requiring all second or third class buildings now existing within the congested business district of the city to be equipped with sprinkler service, except that houses for habitation not used in any portion for any other purpose need not be so equipped, and that hotels and

*For definition of "congested district" see draft of proposed law in Appendix X.

lodging houses need be so equipped only in the basement, first story and public halls, dining rooms or assembly rooms.*

2

To prevent carelessness or deliberate mismanagement:—

(a) The passage of a law creating a Fire Bureau empowered to examine into every fire and make a published report thereon, giving in detail the cause of the fire and locating the exact responsibility in much the same manner as the coroner's jury investigates a crime.

(b) The passage of a law regulating the issuing of fire insurance covering any building previous to approval by formal act of said Fire Bureau.

3.

To improve the efficiency of the fire-fighting systems:—

(a) The installation of a high pressure fire service carried through the streets of the congested portion of the city.†

(b) Doing away, as rapidly as conditions will permit, with the obsolete and cumbersome system of portable engines and machinery operated by horses, and the substitution of self-propelled fire apparatus.

REASONS FOR RECOMMENDATIONS

We offer the following reasons for our recommendations:

Third Class Structures

Third class structures are now prohibited within what is known as the building limits, including the central business portion of the city.‡

*According to the building law a first class building is one wholly of fireproof construction; a second class building is one of which the exterior is wholly of non-combustible material, while a third class building is one constructed within and without, wholly or in part, of wood.

†This the committee previously recommended, and the city has accepted chapter 312 of the Acts of 1911, providing for such a service. For copy of law, see Appendix IV.

‡For existing ordinances in Boston and other cities, see Appendices V and VI.

The fire loss in third class buildings throughout the outlying districts of the city is admittedly very light, but the danger from these is not merely that they shall burn themselves but that by burning they shall communicate fire to their neighbors. The business districts are constantly encroaching on the residential and the most dangerous zones are in the fringe between the thickly built districts and the residential. It is more than likely that we may have a most disastrous conflagration in the Dorchester and Roxbury districts which are built up almost entirely of cheap wooden apartments, placed very close to one another in continuous blocks. Notwithstanding the menace they are to the city, we cannot obliterate these structures, but we can prohibit the building of any new districts of the same sort, and can provide that as the city pushes towards the suburbs it will not be faced with such conditions as now exist in the thickly settled region to the south and west.

The Mayor and the Fire Commissioner of Boston both favor an extension of the building limits, within which wooden buildings are prohibited. This committee believes that such extension should include the entire city of Boston. The objection which has been made to any such extension comes from the owners or representatives of land in the outlying sections which are now regarded as available for the erection of the cheap type of three-story wooden tenement houses, and from the dealers in materials used in the cheaper forms of construction. Opposition is made on the ground that it will be a great hardship to the owners of land and to the tenants who would occupy the buildings to compel the expenditure of a larger amount of money in construction, with a consequent increase in the rate of rental. This committee has carefully examined the merits of these arguments, and has found that the additional cost of construction of second class buildings which would meet the requirements is so small that owners could well afford to lease them at the same rental as the cheaper buildings command, because of the saving in the cost of maintenance and repairs. Several methods of stucco, concrete and brick construction have been suggested. A set of house plans of a building which has actually been erected was submitted to five different contractors and their estimates have been averaged for purpose of comparison. These were published in the March issue of the Brickbuilder (a trade journal) and are reproduced in Appendix VII. The average estimate for

a frame building, covered with clapboards, was $6759.95. The average increase in cost for other types was as follows:

Second Class Construction.

Stucco on frame	2.92	percent
Brick veneer on studding	5.83	"
Stucco on hollow block	6.34	"
Brick veneer on boarding	6.95	"
Ten inch brick wall—hollow	9.16	"
Brick veneer on hollow block	10.77	"

The owners of a special form of poured concrete construction state that by their method a six room house has been built at approximately the same cost as for the cheapest frame construction and that the cost is about 15 percent less than if constructed with brick walls.

By comparison of the figures given here and in Appendix VII, it will be seen that the cost of a second class building need not be more than 15 percent above the cost of a third class structure. We have obtained expert opinions on this subject and are convinced that these approximations are fairly correct. Furthermore, taking into account the life of a third class building as compared to that of a second class building and comparing the amounts which must be charged off every year for painting, repairs and depreciation, in the course of twenty years, the second class building would represent a yearly cost materially less than that of a third class building. It is difficult to give exact figures representing this saving, as conditions vary so widely, but in Appendix VIII are given some comparisons which are suggestive.

It is therefore the confident belief of this committee that the suggested prohibition of third class buildings will create no real hardship upon owners or lessees of property.

In an address delivered by Mr. Frank Lock in 1909, copy of which has been furnished to the committee, much stress is laid upon the various causes of fire waste, the use of wood in outside construction and particularly upon roofs as being one of the principal causes. In this address, it is stated that 27 percent of fire losses are due to exposure—that is the spreading of fire from one building to another. If, therefore, it is possible to reduce the danger of such spreading, the public interests will be greatly served. This we believe can be done by the extension of the building limits, as proposed.

First Class Buildings in Congested District

In regard to first class buildings in the congested district, this committee is willing to admit that looked at merely as a matter of first investment, first class construction throughout would appear expensive. But in a city like Boston the desire of the individual to reap a large return on his investment ought to be subordinated to the rights of the city as a whole. Every great fire of the past has shown the value of fireproof buildings to stop, or at least limit, a conflagration. No structure is absolutely fireproof, but every fire has shown that it is perfectly practicable to build a structure which cannot be ruined even by the fiercest fire, which is seldom more than superficially damaged, and whose efficiency as a fire check has been thoroughly demonstrated. So that, while the insistence upon nothing but first class construction in the congested district may be regarded by some as a hardship, taking the city as a whole it would be a decided economy for the community by vastly reducing the number and extent of fires.

Sprinklers in Existing Second Class Buildings

Those citizens who now have dangerous buildings ought to bear the burden of increased cost rather than their neighbors who have safer buildings, on which the insurance rates are vastly increased because the others will not take proper precaution against the spread of fire. The recommendation that existing second class buildings be equipped with sprinklers comes as a natural corollary. We cannot get full benefit of the conflagration stop afforded by a first class building if the neighboring buildings remain a positive menace. We cannot compel the removal of such structures, but we can at least make them fairly safe. Nor does this entail a real hardship on the owners of such property, as it effects a yearly saving in insurance premiums sufficient to pay the cost of the sprinklers in a very few years. See Appendix IX.

Establishment of a Fire Bureau

There is no one body at the present time which is able to investigate properly the causes of and to fix the responsibility for fires, as would be a Fire Bureau constituted as we have indicated. We know of no way so thoroughly to arouse public and individual appreciation of the gravity of the situation, or so thoroughly to emphasize the fact that the great majority of fires are due in the last analysis to entirely preventable carelessness, often criminal in the

extreme, as to fix definitely the responsibility and give fullest publicity to every fire—not merely by perfunctory reports in public documents, but by statements of facts, names and findings in the daily papers, as well as by recommendations to the proper law officers for prosecution of offenders. By this means the utmost publicity would be given to carelessness or criminal negligence. The Bureau would also be charged with the duty of preparing and publishing regulations which would minimize the effects of carelessness, provide for safety of life, and for educating the public in the simpler facts and methods of fire protection.

Insurance Upon Buildings Not Approved.

The principle of prohibiting the placing of insurance upon buildings not formally approved is not an innovation. An exactly similar procedure is followed now in the use of gas, electricity, boilers and elevators. Neither the gas company nor the electric light company is allowed to supply any gas or current until the installation has been approved by a formal certificate from the proper authority. A company which insures a boiler not up to standard is liable to lose its license to do business. No elevator can be operated until it is inspected and approved. Let us apply the same principle to protection against fire, and prohibit insurance unless the building is approved. This does not mean that a mere technical defect or violation would make the building uninsurable, but simply that it must pass under the Fire Bureau's supervision before the owner can purchase indemnity by securing an insurance policy. Under existing conditions any kind of building can be insured at a price, no matter how flagrantly it violates the laws and common prudence. If the owners of such property appreciated that they could not thus protect themselves they would be very likely to put their premises in proper order.

High Pressure Fire Service

A report has recently been issued by the National Board of Fire Underwriters on "The Desirability of a High Pressure Fire System in the City of Boston." It emphasizes the fact that in the business district which is the fourth largest district in point of value in the country, there exist conditions which may breed a conflagration at any time. It states, "There are large-area blocks, with crowded and poorly accessible interiors, no floor-opening or window protection where especially needed and numerous large

floor areas, affording opportunity for the rapid spread of fire. The narrow streets in this district are of little value in preventing the spread of fire."

In addition to the reasons set forth in the report of the National Board of Fire Underwriters, the Committee favors the installation of the high pressure service on the ground that the present financial condition of the city would justify the expenditure necessary for the installation of this system. Furthermore, the insurance companies, for the first time, are willing to promise a definite reduction in the insurance rates estimated at between $100,000 and $125,000. See Appendix XI.

The experience of cities where a high pressure service has been installed illustrates the possibilities and advantages of such equipments. Philadelphia has used its system for nearly eight years, and New York its system for three years. The superiority of the high pressure service over the use of fire engines has been amply demonstrated.

Adoption of Self-Propelled Fire Apparatus

The wisdom of adopting self-propelled fire apparatus has been demonstrated wherever it has been done. We advise that as the present machines wear out they be replaced by self-propelled apparatus, for the simple reason that such would be more readily available, more easily controlled, more powerful, require less space for housing, and cost less to operate. For a brief study of the Boston Fire Department see Appendix XII.

Conclusion

No one can reasonably question the desirability of our recommendations from the point of view of the prevention of fire. Furthermore, measured by the financial standard the acceptance of the high pressure system as provided by Chapter 312 of the Acts of 1911 means a saving of at least $100,000 a year, in insurance premiums alone. The actual possible saving beyond this is altogether problematic in amount, but if, by virtue of the saving in the construction hazard we reduce the annual fire loss only to that of the best average cited for any American city (Philadelphia) we would save $2.14 per capita ($3.60 less $1.46) or over one and one-quarter million dollars per year in Boston alone. And if by using the best endeavors of the Fire Bureau as outlined in this report, eliminating even a measure of carelessness, we succeed still further in cutting

down our annual fire loss of $3.60 to only twice the per capita loss in Germany, 49 cents, our average loss would then be 98 cents per capita, a saving of $1,834,000 per year on a population of 700,000.

We make no specific recommendation in regard to amendments of the building laws as such. Many suggestions for such amendments have been made to us and there are undoubtedly many improvements possible, but there are several committees and commissions which are giving most careful study to this subject and we feel there is no call for action of this detailed kind by this committee. Such action would only complicate a situation which is already enough confused. We feel that the best way to meet the situation as far as the Boston Chamber of Commerce is concerned is for this committee to limit its recommendations to a minimum number of absolutely necessary, broad, fundamental requirements. If these can be put in force, minor changes in the building and fire laws would naturally and easily follow. Without the essential changes recommended any tinkering with existing laws would fail to give relief.

Respectfully submitted,

COMMITTEE ON FIRE PREVENTION,

CLARENCE H. BLACKALL, *Chairman,*
EDWARD D. DENSMORE,
JOHN B. GRAHAM,
PATRICK A. O'CONNELL,
LESLIE C. WEAD,
ROBERT S. COFFIN, *Secretary.*

Appendices

APPENDIX I.

PART I.—STATISTICS OF FIRE LOSSES IN UNITED STATES.

Table 1.—Annual Fire Losses in the United States for Thirty-six Years—1875-1910 Inclusive.

(Statistics gathered by the National Board of Fire Underwriters.)

Year.	Aggregate Property Loss.	Year.	Aggregate Property Loss.
1875	$ 78,102,285	1893	$167,544,370
1876	64,630,600	1894	140,006,484
1877	68,265,800	1895	142,110,233
1878	64,315,900	1896	118,737,420
1879	77,703,700	1897	116,354,575
1880	74,643,400	1898	130,593,905
1881	81,280,900	1899	153,597,830
1882	84,505,024	1900	160,929,805
1883	100,149,228	1901	165,817,810
1884	110,008,611	1902	161,078,040
1885	102,818,796	1903	145,302,155
1886	104,924,750	1904	229,198,050
1887	120,283,055	1905	165,221,650
1888	110,885,665	1906	518,611,800
1889	123,046,833	1907	215,084,709
1890	108,993,792	1908	217,885,850
1891	143,764,967	1909	188,705,150
1892	151,516,098	1910	214,003,300

Table 2.—Conflagrations Involving Losses of $500,000 And Over Occurring In 1910.

(Statistics gathered by the National Board of Fire Underwriters.)

February	4	New York City, N. Y., Med. Supply, U. S. A. Dept.	$ 500,000

	22	Pueblo, Colo., Minnequa Plant of Colo. Fuel and Iron Co., Pattern Storehouses	600,000
March	5	Winlock, Wash., Business Portion of Town..	650,000
	24	Hambleton, W. Va., Tannery	800,000
	26	Phila., Pa., Oil Warehouse, Mantel Factory and Lumber Yard and Mill	600,000
April	3	Omaha, Neb., Central Gr. Elev. of Nye-Schneider Fowler Co., Manly Milling Co., and Box Cars	600,000
	9	Beaver Falls, Pa., Union Drawn Steel Acme Mfg. Co. Plants and Acme Typewriter Mfg. Co.	500,000
	27	St. Louis, Mo., Brewery Plant of Anheuser-Busch Brewing Association	530,000
May	2	Ford City, Pa., Pittsburgh Plate Glass	
	4	Kansas City, Kan., Peet Bros. Mfg. Co., Soap and Glycerine Plant	1,500,000
	22	Elkhart, Ind., C. G. Conn, Band Instrument Factory	500,000
	25	Bluff Point, N. Y., Hotel Champlain	500,000
	28	Minneapolis, Minn., Implement Warehouses	750,000
June	27	Paterson, N. J., Van Dyke Furniture Store and others	502,000
July		Marinette, Wis., Timber Lands and Saw Mills	1,200,000
	16	New York City, S. S. Pier and Freight (Met. S. S. Co.)	750,000
		Lakeview, Ill., Grain Elev. and Brewery	600,000
	18	Wallace, Idaho, Half the Town	1,000,000
August	9	Boston, Mass., Blacker & Shepard Lumber Yards and others	600,000
	17	Jersey City, N. J., Truslow & Fulle Cork Wks., and others	700,000
	24	Stevenson, Wash., Saw Mill and Standing Timber	600,000
October	18	James City, Pa., American Plate Glass Wks.	500,000
	20	E. St. Louis, Ill., Chicago & Alton R. R. Freight House and others	500,000
	25	Superior, Wis., Coal Shed and Wharf	500,000
	29	Topeka, Kans., Storage Yards of Atchison, Topeka & Kansas R. R.	500,000
	30	Omaha, Neb., Creamery and Cold Storage (Plant of Fairmount Creamery Co.)	600,000
November	3	Phila., Pa., Cunningham Supply Co., Bldg., Block and Storage Warehouse	500,000
	27	Livingstone, Ala., Sumter Lumber Plant ...	500,000
December	6	Evansville, Ind., H. Feurich, Cig. Fcty. and others	750,000
	21	Cincinnati, O., Kippendorf & O'Neil, Shoe Fcty. and Leather Works	1,750,000
	22	Chicago, Ill., Morris & Co., Meat Pckg. Plants	1,000,000
		Total .....$	22,582,000
..		Conflagrations prior to 1910 since 1866	983,234.135
		Total for period .....$	1,005,816,135

Table 3.—Statistics of Fires in the Ten Largest American Cities, According to Population. 1910.

City	Area, Square Miles	Population	Total Number of Fires	Fires				Loss, Insured and Uninsured			Loss per Capita
				Confined to building or place of origin	Confined to floor	Extending to Adjoining Buildings Only	Extending beyond Adjoining Buildings	Buildings	Contents	Total	
New York*	326.8	4,766,883	14,405					3,068,272	5,523,559	8,591,831	$1.78
Chicago	195.5	2,185,283	10,490	9,445	6,103	266	279			6,046,773	2.76
Philadelphia	129.5	1,549,008	3,717	3,115		98	504			2,588,005	1.67
St. Louis	61.37	687,029	3,415	3,389	3,350	22	4	427,615	727,995	1,155,610	1.68
Boston	37.04	670,585	2,974	2,834	1,931	27	13	1,292,996	2,158,316	3,451,312	5.15
Cleveland	46	560,663	2,164	2,016		77	71	377,464	318,612	696,076	1.19
Baltimore	33	558,485	1,554	1,551		2	1	184,675	537,562	722,237	1.29
Pittsburg	40.67	533,905	1,812	1,769		24	19			979,253	1.83
Detroit	41.5	465,766	2,162							1,024,003	2.18
Buffalo	42	423,715	1,786	1,750		30	6			976,475	2.31

* Including Manhattan and Bronx, Richmond, Brooklyn and Queens.

Statistics gathered by the National Board of Fire Underwriters.

(Ten Years Average.)

Table 4—Statistics of Fires in the Ten Largest American Cities, According to Population. 1900 to 1909 Inclusive.

City	Area, Square Miles	Population	Total No. of Fires	Fires				Loss, Insured and Uninsured			
				Confined to Bldg. or Place of Origin	Confined to Floor	Extending to Adjoining Bldgs. Only	Extending Beyond Adjoining Bldgs.	Buildings	Contents	Total	Loss per Capita
New York	325.95	3,839,590	10,677							9,175,294	2.39
Chicago	192.09	1,886,062	5,513	a5,719	x5,131	**159	**26	*1,518,805	*2,418,300	4,534,305	2.40
Philadelphia	129.5	1,343,942	3,308	d3,145	b2,562	d76	d7	a609,487	a1,413,467	2,302,110	1.71
St Louis	61.37	620,051	2,500	**2,215	d	**112	**33	c542,136	c1,006,614	1,449,279	2.34
Boston	37.04	583,593	2,242	2,165	d1,515	55	22	831,779	1,243,030	2,074,809	3.56
Cleveland	27.3	422,193	1,675	d1,633		d21	d11	xx356,385	xx444,800	797,678	1.88
Baltimore	33	539,545	1,488	c1,492	a1,339	c31	c¼	**348,280	**786,276	5,798,439	d1.98
Pittsburgh	x40.67	x572,500	x1,707	x1,648		x39	x20	*731,933	*353,319	x828,696	x1.44
Detroit	32.4	342,224	1,335	*899						849,762	2.61
Buffalo	42	372.805	1,357	1,305	b383	48	4	*755,876	*1,225,367	1,221,122	3.27

* 1year; x 2 years; xx 3 years; ** 5 years; a 6 years; b 7 years; c 8 years; d 9 years.

Statistics gathered by the National Board of Fire Underwriters.

PART II.—COMPARISON OF FIRE LOSSES IN AMERICA AND EUROPE.

Table I.—Fire Losses in Six European Countries.
(Statistics gathered by the National Board of Fire Underwriters.)

Country	Years.	Annual Average.	Population, 1901.	Loss per capita.
Austria	1898-1902	$ 7,601,389	26,150,597	$0.29
Denmark	1901	660,924	2,588,919	.26
France	1900-1904	11,699,275	38,595,500	.30
Germany	1902	27,655,600	56,367,178	.49
Italy	1901-1904	4,112,725	32,449,754	.12
Switzerland	1901-1903	999,364	3,325,023	.30
Average loss per capita				33 cents.

Table 2.—Per Capita Fire Losses in 1907 in American and European Cities, Classified According to Population.
(Statistics for the United States gathered by the Geological Survey and for Europe by the Bureau of Manufactures.)

Population.	United States	Europe.
Over 300,000	$2.24	$0.65
100,000 to 300,000	2.14	.37
50,000 to 100,000	2.47	1.67
30,000 to 50,000	3.28	.72
10,000 to 30,000	2.37	.81
Under 10,000	3.47	....

Fire Losses in America and European Countries, 1910.
(Statistics gathered by the National Board of Fire Underwriters.)

	Number of Cities Reporting Loss.	Population.	Per Capita Loss.
United States	297	29,996,723	$2.39
England	11	2,335,847	.44
France	8	4,392,529	.92
Germany	13	5,616,822	.19
Ireland	2	657,680	.45
Norway	1	244,000	.25

Table 3.—Fire Losses in America and in European Cities of The Same Size.

(Statistics gathered by Geological Survey and Bureau of Manufactures. Each of the Foreign Cities Is Compared With the American City Marked by the Same Numeral.)

European Losses for 1904.

	City.	Population.	Fire Loss.	Loss per capita.
1	Paris, France	2,714,500	$1,266,282	$0.47
2	Frankfort, Germany	324,500	99,492	.31
3	St. Petersburg, Russia	1,500,000	2,128,541	1.42
4	Birmingham, England	550,000	226,506	.41
5	Sheffield, England	426,686	75,989	.18
6	Toulon, France	101,602	55,391	.55

7	Bremen, Germany	203,847	78,372	.38
8	Molenback, Belgium	63,678	106,150	1.67
9	Lalken, Belgium	31,121	22,349	.72
10	Etterbeck, Belgium	23,992	19,504	.81

United States Losses for 1907.

1	Chicago, Ill.	2,049,185	$3,937,105	$1.43
2	Cincinnati, Ohio	345,230	1,971,217	5.70
3	Philadelphia, Pa.	1,441,735	2,093,522	1.45
4	Baltimore, Md.	553,669	916,603	1.66
5	Cleveland, Ohio	460,000	515,194	1.12
6	Atlanta, Ga.	104,984	225,237	2.15
7	St. Paul, Minn.	204,000	522,447	2.56
8	Evansville, Ind.	63,957	196,702	3.08
9	Oskosh, Wis.	31,033	80,500	2.59
10	Easton, Pa.	25,238	33,073	1.27

PART III.—STATISTICS OF FIRE LOSSES IN BOSTON.

Table I.—Statement of Fire Losses in Boston For Past Ten Years.
(Report of Boston Fire Department.)

Year	ending	February	1, 1901	$1,702,217
"	"	"	1, 1902	1,830,719
"	"	"	1, 1903	1,762,619
"	"	"	1, 1904	1,674,333
"	"	"	1, 1905	2,473,980
"	"	"	1, 1906	2,130,146
"	"	"	1, 1907	1,130,334
"	"	"	1, 1908	2,268,074
"	"	"	1, 1909	3,610,000
"	"	"	1, 1910	1,680,245

APPENDIX II.

RESULTS OBTAINED IN THE UNITED STATES BY THE ASSOCIATED FACTORY MUTUAL COMPANIES.

It has been suggested in the report that introduction of certain preventive measures might reduce the fire loss in the United States. In this connection it is interesting to note the results which have been obtained in the United States by the Associated Factory Mutual Companies. The basis of business in the mutual companies is as follows: Each person who insures agrees to certain rules and regulations, and accepts his insurance at a certain fixed rate. At the end of the year a rebate is given from this rate, depending upon the extent of the losses which have occurred. If there have been few fires a large rebate results. The reason for insuring in the mutual companies is to obtain a low rate of insurance and also freedom from fires. The mutual companies, however, insist upon certain rules and regulations regarding construction, protection and maintenance of equipment, which are in accordance with the best known methods of fire protection. The fundamental principle of the mutual companies' protection is the use of automatic sprinklers. A careful system of inspection is maintained to see that all regulations are carried out at all times.

The buildings which are insured in mutual companies are not, in general, fireproof, but are of what is termed "mill construction"; that is, brick walls with wooden interior, the wooden construction, however, being in accordance with certain rules.

From year to year the fire losses in the mutual companies have become smaller and smaller, until at the present time the loss was reduced to about one and one-half cents for each $100 covered for the year 1909 in the Boston Manufacturers Company. Compare this with the average loss for the stock companies of the United States, which is 50 cents for each $100 covered.

It is, of course, not practicable to apply the methods of the associated companies to all buildings in the country, but an application of these principles at least can be made with tremendous advantage. From such figures as are obtainable from the stock companies it appears that the average loss in buildings which are sprinkled runs as low as 10 cents per $100 covered.

This illustration is cited merely as indicating the possibilities that may be obtained from protection.

APPENDIX III.

PROFITS OF INSURANCE COMPANIES

[EXTRACT FROM THE REPORT OF THE ILLINOIS FIRE INSURANCE COMMISSION TO THE SENATE AND HOUSE OF REPRESENTATIVES. JANUARY 4, 1911.]

The premiums received by licensed fire companies in the United States for ten years ending January 1st, 1908, were $1,982,122,000, and the losses for the same period were $1,170,801,000. The expenses were $687,642,000, making a total for losses and expenses of $1,868,425,000. The difference between the total income and outgo of the business for this ten year period is only $113,727,000, and if the increase in the unearned premium reserve is taken into account these figures show that for the ten-year period mentioned there was no underwriting profit on the business as a whole. Again, if we take similar statistics for any ten-year period since statistics have been kept in the business, we are unable to find any period where the aggregate net profits have exceeded about 3 percent, while as will later be shown, during the past ten years in the United States instead of being a net profit there has been a net loss on the aggregate sales of fire indemnity.

It should be remembered that the aggregate profits or losses referred to are purely profits or losses on the thing sold, namely, fire indemnity as embodied in the policies issued, and that in most States the printed conditions of these policies are prescribed by law; but the stock fire company has two sources of income:

First: Net profits on the indemnity sold as above indicated.

Second: Interest on the company's assets. This interest is divisible into two parts, namely interest on the funds paid in by policy holders which have not yet been earned either by payment of loss or by expiration of policies. This fund, known as the unearned premium reserve, is maintained by every company under the statutory requirements of the several States in which it transacts business. Taking all business in force, annual and term, this fund as required by law would probably average about seventy percent of the aggregate annual premiums, though the companies are compelled to pay cash for commissions and other running expenses, averaging say forty percent of the premiums; hence it is probably not far from the truth to assume that the average income derived from the unearned premium fund would be equivalent to interest

at current rates upon a sum equal to say one-half the annual premiums. The States very properly scrutinize the character of the investments of the companies, and the rate of interest is necessarily low, averaging probably not more than 4 percent per annum. This would yield the companies, as interest upon the unearned premium reserve, say 2 percent annually, which added to the 3 percent profits from the sales of indemnity during the most profitable decades in the history of the business, would leave a net profit to all companies upon all business of not over 5 percent. This estimate does not include the large number of companies that have been forced out of business by city conflagrations or other causes, nor the companies still in existence that have had their assets depleted or destroyed by conflagrations and have made the impairment good by contributions from stockholders or by sales of new stock. A number of the most prominent stock fire companies now doing business in this country have been saved from destruction in this way, and so far as the fire companies of this State are concerned, the Chicago fire wiped every Illinois company out of existence, while the San Francisco fire ruined three of the largest Illinois companies. Two of these companies passed out of existence, while one is able to continue in business because its stockholders heroically restored its entire assets out of their own pockets. It is facts such as these that cause fire underwriters of the longest experience to contend that, taking the country as a whole, no profit has been made from the sale of fire indemnity during the past fifty years or since statistics have been kept.

Each company's own capital stock and net surplus are invested in stocks and bonds, and as before stated, these investments must pass muster with the State authorities, who are prompt to rule out any investments of doubtful character. The high character of investments thus required is naturally accompanied by a reduced income from the dividends and interest received from these investments. The income derived from this source probably does not average over 4 percent on the aggregate assets of the companies. By the nature of their liabilities fire companies are largely debarred from investing in real estate loans, as the impending danger of city conflagrations compels them to invest in securities that can be converted into cash in the great markets of the country on very short

notice. Some companies have been notably successful in investing their funds in the stock market and in this way have made more money by judicious investments than they have made from underwriting profit. It is obvious that this income from the company's own assets has no connection with the transaction of fire insurance, as the stockholders, either singly or collectively, could invest their money to better advantage without subjecting it to the restrictions of State control or to the perils of city conflagrations which now and then consume by a single fire the greater part of fire insurance capital.

* * * * * * *

So far we have been describing the fire insurance business as a whole. An inspection of the companies severally, indicates that while the statistical totals show a net profit ranging, according to the various sources of information, from nothing to a possible maximum of 5 percent, this profit, whatever it may really be, has been very unequally distributed among the campanies. An examination of the reports filed with the Commission shows that from the time of the Chicago fire to the present, about forty years, hundreds of companies have failed or retired. Possibly no fact of greater significance can be presented in this connection, than the statement made by Mr. Charles A. Jenny, F. S. S., in the publication "Fire Insurance by States," 1909, that from 1880 to the close of 1908, 912 fire insurance companies retired from business in the United States, and at the end of the period mentioned only 162 stock companies were reporting to the New York department. Of the companies now in existence worthy of consideration, some are losing ground and evidently destined to an early retirement. Some are barely holding their own, some show what might be considered a fair growth, while a few seem to be forging ahead at a rapid pace. There is no way of accounting for these things except through what would be a tedious and profitless analysis of the financial statements of the several companies. The disparities are no greater perhaps than can be found in other forms of modern activities and may probably best be accounted for by the law of survival found in every industry. It is proper to point out, however, the significant fact that the records do not show a single company that might be considered a notable success which has begun business during the past thirty years and done business on its own responsibility, without the backing in some form of an old and strong company.

APPENDIX IV.

[CHAP. 312, ACTS OF 1911.]
AN ACT TO PROVIDE FOR A HIGH PRESSURE FIRE SERVICE IN THE CITY OF BOSTON.

Be it enacted, etc., as follows:

SECTION 1. The commissioner of public works of the city of Boston is hereby authorized to prepare plans and to proceed to the immediate installation of a suitable and efficient system of high pressure fire service for the said city.

SECTION 2. For the purpose of defraying the expenses incurred under the provisions of this act the city council may appropriate during the ensuing six years the sum of one million dollars. The said appropriation shall be not less than one hundred and fifty thousand dollars for each year, and the amount which the city council shall thus appropriate in any one year shall be included in the statutory limit of indebtedness of the city for that year.

SECTION 3. The said city is hereby authorized to take such quantities of water as may be necessary for the proper carrying out of the purposes of this act from the Charles river basin. It shall also be authoized to purchase or to erect such pumps and stations as may be necessary to carry out the purposes of this act. The work of building such pumping stations as may be found necessary under the authority of this act shall be done by contract publicly advertised. Not more than fifteen percent of the indebtedness incurred under the provisions of this act in any year shall be expended for day labor.

SECTION 4. This act shall take effect upon its acceptance by the city council and mayor of the city of Boston. (Approved April 20, 1911.)

APPENDIX V.

BUILDING LIMITS AS DETERMINED BY EXISTING ORDINANCE.

The building limits referred to in section eighteen of chapter 419 of the acts of the year 1892 are established as follows: All that portion of the city which is included within a line beginning at the intersection of the center lines of Dover and Albany Streets, and thence running east through the center of said Dover Street to the harbor commissioners' line, thence by the said harbor commissioners' line around the northerly portion of the city to a point on Charles River at the intersection of said line with the easterly line of St. Mary's Street extended; thence along said easterly line of St. Mary's Street and the boundary line between Brookline and Boston to the center of Longwood Avenue; thence through the center of said avenue to the center of St. Alphonsus Street; thence through the center of said street to the center of Ward Street; thence through the center of said Ward Street to the center of Parker Street; thence through the center of said Parker Street to the center of Ruggles Street; thence through the center of said Ruggles Street to the center of Washington Street; thence through the center of Washington Street to a point opposite the center of Palmer Street; thence through the center of said Palmer Street and through the center of Eustis Street to the center of Hampden Street; and thence through the center of said Hampden Street and the center of Albany Street to the point of beginning; the said district being shown on a plan made by the city surveyor, dated June 28, 1881, and deposited in the office of the city engineer.

APPENDIX VI.

PHILADELPHIA AND NEW YORK BUILDING LIMITS

The Philadelphia building law of 1904, Section 11, provides that all buildings in the city limits shall be of second class construction, namely, non-combustible exterior, except that the council may by ordinance permit the construction of frame buildings in the rural portions. The ordinance under which the city is working is apparently that approved in March, 1894. This as amended, permits of third class structures only in portions of the 21st, 27th, and 35th wards. No permit can be granted for such buildings, unless the applicant shall have the consent in writing of at least two-thirds of the adjoining or abutting property owners on both sides of the street, and it is not allowable to enlarge a frame building, to remove any such building to an adjoining lot, or to repair or reconstruct any frame building, which has been injured more than 50 percent of its original value by wear and tear or by effects of elements or by fire. A wooden building in this area must not exceed 45 feet in height. Wooden buildings must be separated by at least three feet or by brick walls, and any building used for other than dwelling house purposes must be at least 10 feet from any other building 25 feet or more in height, and at least four feet from a building less than 25 feet in height.

The ordinance thus practically prohibits third class buildings in all but an extremely small portion of the city. As a matter of fact, it is the exception to find in Philadelphia wood houses under construction.

The designation "fire limits" is used in New York to designate the district within which no frame or wooden structure shall be built. In the Borough of Manhattan it includes all of the portion south of 165th Street and the Harlem River. In the Bronx it includes the district roughly bounded by the extreme northerly point of Manhattan. In Brooklyn the line is quite irregular, but is carried out as far as Flatbush Avenue in one direction, and includes the 30th Ward. In the Borough of Queens the district includes the area bounded by Newton Creek, Not Avenue, the East River and westerly line of Van Alst Avenue. A great deal of the property included in these limits was within a very few years occupied as farm land. Practically the whole of the Island of Manhattan, the major portion of the Bronx and Brooklyn, and considerable section of Queens, are thus safeguarded against buildings constructed with exterior of inflammable material.

APPENDIX VII.

THE COST OF A HOUSE.

A Comparison of Brick, Wood, Cement, and Hollow Block Construction.

By J. Parker B. Fiske.

There can be little doubt, even in the mind of the casual observer, that Brick is a very desirable material with which to build a house. The public has gradually come to realize the enormous loss by fire, the excessive repairs, the rapid depreciation and the discomfort in both summer and winter arising from frame construction, and to appreciate the fact that the House of Brick is not only fireproof, but that it requires no painting, that it does not decay or depreciate, and that, of all types of construction, it is the most beautiful.

How is it, then, that America has continued so long to build her houses of wood, while the older countries of Europe abandoned this type of construction many generations ago?

An answer may be found in conversation with almost any intelligent man or woman—"The first cost of the Brick House has been prohibitive."

However true this opinion may have been a generation ago, or however natural, today, to a people born and reared in a land of wooden houses, it no longer holds good.

Conditions have changed; wood is no longer cheap; our forests have receded from civilization and have dwindled in size until frame construction costs almost as much as Brick—until, with its "upkeep," it costs more.

A great majority of the American people, however who enjoy to the largest extent the benefits of human ingenuity and skill in other matters, are still denying themselves the advantages of a superior material for the construction of their homes because of a mistaken idea as to its relative cost.

It is time, therefore, that the present-day facts be made public in a clear and logical manner, that all may know the truth.

In order to prepare an accurate statement regarding the relative costs of different styles of construction, the writer has instituted a

careful investigation, in which all variable quantities were eliminated and a bona fide bid obtained for the construction, in a given locality, of a series of houses, each one exactly like the others in every particular except the outer walls, which in the several houses were to be constructed of the several materials we wish to compare, i. e., Brick, wood, cement and hollow block.

Lest a single contractor might make an error, or for some reason be unduly favorable to one material as against another, we have secured simultaneous bids from several equally reliable contractors. While the several figures on the Brick House vary considerably among themselves, as is inevitable with competitive bids, the relative figures on Brick, wood, etc., are about the same in the case of one contractor as of another, and the average gives a fair and truthful conclusion.

In making this investigation, a little modern eight-room house, of good design and excellent arrangement was chosen, the original having been actually built near Boston, Mass., under the direction of Thorndike & Kiessling, architects.

This house is typical in size, arrangement and cost of thousands of houses which are being erected throughout the East.

The architects were commissioned to prepare the plans and specifications necessary for obtaining bids for this house when built with the following types of exterior wall construction, all other details being common to all types:

Description of Various Types of Outer Wall Construction.

Type 1. Frame covered with boards and finished with clapboards over building paper; inside surface furred, lathed and plastered.

Type 2. Frame covered with boards and finished with shingles over building paper; inside surface furred, lathed and plastered.

Type 3. A 10-inch Brick wall, i. e., two 4-inch walls tied together with metal ties and separated by a 2-inch air space; inside surface plastered directly on the Brick work. Face Brick to cost $17.50 per M.; inside Brick, $9.00 per M.

Type 4. A 12-inch solid Brick wall; inside surface furred, lathed and plastered. Face Brick to cost $17.50 per M.; inside Brick, $9.00 per M.

Type 5. Eight-inch hollow terra cotta blocks, stuccoed on the outside and plastered directly on the inside.

Type 6. Six-inch hollow terra cotta blocks, finished with a 4-inch Brick Veneer on the outside and plastered directly on the inside. Face brick to cost $17.50 per M.

Type 7. Frame covered with boards and building paper, furred and covered with stucco on Clinton wire cloth; inside surface furred, lathed and plastered.

Type 8. Frame covered with boards (building paper omitted), and finished with a 4-inch Brick Veneer on the outside; inside surface furred, lathed and plastered. Face Brick to cost $17.50 per M.

Type 9. Frame finished on the outside with a 4-inch Brick Veneer tied directly to the studding (boarding omitted); inside surface furred, lathed and plastered. Face Brick to cost $17.50 per M.

A separate drawing showing the details of each type of outer wall construction was prepared, and each was accompanied by a set of complete specifications for the entire house.

Everything about the house, except the outer wall construction, was identical in all nine types, and may be briefly covered by the following table:

Details Common to All Types.

A—Foundations .....Local Stone.
B—Cellar Floor. Finished with 2-inch concrete of Portland cement.
C—Chimney.....Faced with Brick costing $17.50 per M.
D—Fireplaces.....Faced with Brick costing $17.50 per M.
E—Plastering.....First-class "two coat" work.
F—Exterior Finish.....Cypress
G—Blinds.....White Pine
H—Screens.....Copper bronze on white pine frames.
I—Window Frames.....Hard Pine
J—Floors.....Double floors throughout, with paper between, except in unfinished attic; Georgia pine upper floors; main hall on first floor of oak.
K—Inside Finish.....North Carolina Pine
L—Doors.....Washington Cedar.
M—Hardware.....Bronze finish of ordinary type, costing $60.00 for the job.

O—Conductors..... Copper.
P—Flashing..... Tin.
Q—Electric Fixtures.....Costing $80.00.
R—Hot Water Heating.....Costing $250.00 complete.
S—Wiring .....Costing $68.00.
T—Plumbing .....Costing $370.00.
U—Painting.....Exterior and interior; clapboard house, $225.00; other houses, $130.00.
V—Glazing.....Double thick German glass.

Note:—Shades, kitchen range and tile work not included.

The following local contractors of well known reputation and experience were then selected:

W. F. Kearns Company.....Boston
McDonald & Joslin Company.....Boston
P. H. Jackson and Son Co.....Brockton
R. D. Donaldson.....Lincoln
J. T. Wilson & Son.....Nahant

Each was fully advised of the object of this investigation, and was asked if he was willing to undertake the preparation of figures which should truthfully set forth, to the best of his ability, the costs (including his profit), of houses to be built within ten miles of Boston, according to these several plans and specifications. Each was told that we desired to know the exact truth; if, as alleged by some contractors, the cost of a Brick House is 25 to 30 percent more than one of wood, then we wished to know it, as nothing could be gained by an investigation of this kind which was biased or influenced by any favoritism for one type over another.

Each contractor entered into the spirit of the investigation heartily, and agreed to figure out the cost fairly, to the best of his ability.

Each contractor was given the same information and instructions, and each took plenty of time to figure the entire house with care.

The following are the bids submitted by the five contractors in question, arranged without reference to the above order of names, each bidder standing ready to enter into a contract for the house in question at the figures submitted:

COMPARATIVE BIDS

Type No.	1	2	3	4	5	6	7	8	9
DESCRIPTION.	Clapboard	Shingle	10-inch Brick Wall Hollow	12-inch Brick Wall Solid	Brick Veneer Stucco on Hollow Block	Brick Veneer on Hollow Block	Stucco on Frame	Brick Veneer on Boarding	Brick Veneer on Studding
Bid No. 1	$6,732.00	$.....	$7,572.00	$.....	$7,416.00	$7,777.00	$6,857.00	$7,130.00	$7,080.00
Bid No. 2	6,235.76	6,370.40	6,736.43	7,105.00	6,491.23	6,762.83	6,410.00	6,746.20	6,664.88
Bid No. 3	6,692.00	6,786.00	7,118.00	7,418.00	7,179.00	7,238.00	6,847.50	6,970.00	6,895.00
Bid No. 4	6,690.00	.....	7,496.00	7,801.00	7,202.00	7,648.00	7,000.00	7,496.00	7,420.00
Bid No. 5	7,450.00	7,450.00	7,940.00	8,240.00	7,650.00	7,990.00	7,650.00	7,790.00	7,710.00
Average of bids	6,759.95	6,868.80	7,372.48	7,641.00	7,187.65	7,483.16	6,952.90	7,226.44	7,153.98

COMPARATIVE BIDS

Percentage Excess Cost of Each Type Over Clapboards

Type No.	1	2	3	4	5	6	7	8	9
DESCRIPTION.	Clapboard	Shingle	10-inch Brick Wall Hollow	12-inch Brick Wall Solid	Brick Veneer Stucco on Hollow Block	Brick Veneer on Hollow Block	Stucco on Frame	Brick Veneer on Boarding	Brick Veneer on Studding
Bid No. 1	.0	..	12.5	..	10.2	15.5	1.9	5.9	5.2
Bid No. 2	.0	2.1	8.0	13.9	4.1	8.4	2.8	8.2	6.9
Bid No. 3	.0	1.4	6.4	10.8	7.3	8.2	2.3	4.2	3.0
Bid No. 4	.0		12.0	16.6	7.7	14.3	4.6	12.0	10.9
Bid No. 5	.0	.0	6.6	10.6	2.7	7.2	2.7	4.6	3.5
Average of bids	.0	1.6	9.1	13.0	6.3	10.7	2.9	6.9	5.8

* * * * * * * * *

In making up his figures, one contractor used the following:

Price of Materials.

Lime .....$1.00 per bbl., 200 lbs.
Portland Cement ....$1.60 per bbl.
Spruce Framing .....$26.00 per M. ft. B. M.
North Carolina Pine.....1c. per inch per ft.
Georgia Matched Pine (first quality).....$75.00 per M. ft. B. M.
Shingles .....$4.75 per M.
Clapboards .....$55.00 per M.
Hemlock Boarding.....$22.00 per M. ft. B. M.
6-inch Hollow Blocks.....10 1-2c. per sq. ft.
8-inch Hollow Blocks.....14c. per sq. ft.
Face Brick ....$17.50 per M.
Common Brick .....$9.00 per M.
Allowance for Furring, Lathing, and Plastering....5c. per sq. ft.
Wages of Bricklayers.....60c. per hour.
Wages of Carpenters.....50c. per hour.

Upon inquiry we have found much reliable evidence to corroborate our figures. We are permitted to refer to three investigations conducted by other parties in different parts of the country, as follows:

Mr. Willliam D. Austin, the well-known Boston architect, having made a careful investigation of comparative costs on a $10,000 house, makes the following statement:

"The exterior walls are of brick 8 inches thick, with wooden furring strips against the inner surface, on which the lath and plaster are applied.

"The cost of this brickwork, including the necessary furring and the somewhat more expensive window frames and finish required would be about $1,200. The exterior walls, if in frame with shingles or clapboards, would cost about $600 less, and if in frame with metal lathing and cement plaster, about $500 less. In other words, if the total cost of the house in brick is $10,000, the saving in wood would be six percent and in cement plaster five percent.

"The figures here given are based on carefully-made estimates which were obtained from reliable contractors, and, generally speaking, represent the comparative cost of wood, stucco and brick walls."

Mr. Austin's figures are rather more favorable to the use of

brick than are ours, which confirms the impartiality of our investigation and the conservatism of our conclusions.

Mr. W. E. Dunwody, of Macon, Ga., makes the following statement:

"In January, 1910, I let a contract for a Brick Veneered House, in which I specified local Face Brick at $15 per M. I found from actual experience that a Brick Veneered House cost only about five percent more than a corresponding frame house. Of course, the frame house could be cheapened by making the foundations lighter and by using an inferior grade of lumber, but that would make an inferior house and would not be a fair comparison. The man who wishes to build as cheap a house as possible is not interested in this discussion."

Perhaps the most convincing verification of our figures is that contained in a letter from Hansberger & Livingstone, of Columbus, Ohio, who for fifteen years have been engaged in the building of moderate-sized detached houses for sale. They state as follows:

"We have built about six hundred houses in the city of Columbus. The first year we built entirely of frame, the second year about half Brick and half frame, and then we figured out the cost between the Brick and the frame houses, and we found that the actual difference did not exceed $400 on a $5,000 house, or about eight percent more for brick than for frame.

"We build most of our houses with a 9-inch wall and a one-inch air space, tying the two walls together with metal ties and furring, lathing and plastering on the inside.

"Taking the saving in insurance, heating and painting on the Brick house, we have found that there is really no difference in the cost of the houses at the end of a few years, and we now build Brick Houses almost altogether.

"When we come to sell the house, we find that we can always get about $1,000 more for the Brick house than for the frame house on account of the beauty, durability and economy, which always seems to speak for itself. The Brick House looks so much more substantial than the frame house that we use Brick every time.

"The Brick House is much cooler in summer than the frame house, and we have tested the heating in winter and have found that it takes 33 1-3 percent more fuel for a frame house than it does for one of Brick."

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APPENDIX VIII.

COST OF MAINTENANCE ON HOUSES OF SECOND AND THIRD CLASS CONSTRUCTION.

An estimate of the probable yearly charge-off and repairs on a dwelling of third class construction, namely, all of wood, and on a dwelling of the same size, character of finish, etc., but of second class construction, namely, with exterior of incombustible material:

1. Third class dwelling covering about 1500 sq. ft., two and a half stories and cellar. Cost, $10,000. Estimated efficient life, 20 years.

Annual charge-off with interest at 4 percent	$736.
Repairs, painting, etc	250.
Total per year	$986.

2. Cost of house of same dimensions, but of second class construction, $11,500. Estimated efficient life, 40 years.

Annual charge-off with interest at 4 percent	$580.75
Repairs and painting about	100.00
Total per year	$680.75

The cost per year on the above basis for a third class building is $305.25 more than than of a second class building, an increase of 45 percent.

Applying the same reasoning to the ordinary three tenement house of which so many are built in our suburbs, the comparison would be as follows:

1. Three tenement house entirely of wood or third class construction, approximate cost, $6500. Estimated efficient life, 20 years.

Annual charge-off with interest at 4 percent	$478.40
Repairs and painting	150.00
Total per year	$628.40

2. Cost of house of same dimensions, but of second class construction, $7500. Estimated efficient life, 30 years.

Annual charge-off with interest at 4 percent	$423.50
Repairs and painting	75.00
Total per year	$498.50

In this case the cost per year for the third class building is $129.90 or 26 percent greater than that of the second class building.

Figures such as these can be only suggestive, and it would be almost impossible to establish anything like exact ratios

of cost of maintenance, length of available life, or amount of depreciation, as these do not depend wholly on the nature of the construction, but are much modified by exposure, character of occupancy and by the frequency of change in tenants. But the figures are at least a justification of the conviction held by many experts, that, taking everything into account, a building of second class construction, will wear better, last longer and usually cost less in the long run, than a similar building of third class construction, with combustible exterior. The continued construction of wooden buildings would therefore seem to be a mistake from the standpoint of cost, of use as measured by length of life, and above all, of the fire hazard.

APPENDIX IX.

SPRINKLER INSTALLATIONS.

The fundamental reason for the suggestion that automatic sprinklers be installed in second class buildings within the fire limits, is the prevention of conflagration hazards. When the regulations which are suggested in the report are put in force, only first-class buildings may be built within the fire limits. The introduction of sprinklers in the existing second class buildings will make these buildings practically as satisfactory from a fire hazard standpoint as the first-class buildings. The installation of automatic sprinklers will entail some expense, but we feel that the expense is justified. From experience with the automatic sprinkler in industrial as well as in other buildings, including all sorts of storage warehouses, retail dry goods stores, etc., it has proved itself not only of value from a fire prevention standpoint, but also a good investment on account of the reduction in insurance rates.

The introduction of sprinklers is becoming more and more common in other large cities, and will undoubtedly soon be required by law in nearly all classes of buildings. There are many benefits to be derived from the use of automatic sprinklers which are not ordinarily given sufficient consideration, such as:

(1) The reduction in risk of loss of life, particularly in buildings where large numbers of people are employed;

(2) The saving in water damage, since the fire is put out by the operation of a few sprinkler heads, thus avoiding the flooding of the buildings which usually takes places when the fire streams are called into service. In this connection it is to be noted that the protective department men are familiar with the location of the sprinkler shut-off valves, so that the system can be closed as soon as the fire is out.

(3) Each building in the business section which is equipped with automatic sprinklers, reduces the insurance rates in that section by reducing the exposure hazard. If sprinkling is common very material reductions in insurance rates should follow.

(4) The insurance on the contents of the building would also be materially reduced, thus benefiting the tenants, and more than offsetting the increase in rent made necessary by the expense of installing the sprinklers.

When automatic sprinklers are generally introduced the results will, of course, be most beneficial if the equivalent of two supplies can be given to every building. This could be accomplished by making connections to buildings in blocks, using one large tank or other secondary supply for the whole block. We submit below a table giving the reductions which the Boston Board of Fire

Underwriters will allow for sprinkler systems with two supply pipes, where a wet pipe system is used.

REDUCTION IN INSURANCE RATES IF AUTOMATIC SPRINKLER SYSTEMS ARE INSTALLED.

The Percentage of Reduction is Given in Tabular form with all the Different Alarm Systems Which May Be Used in Conjunction With the Sprinkler System.

	Allowance Wet Pipe System
With Automatic Fire Alarm, Watch Supervision and Sprinkler Notification	50 per cent
With Watch, Automatic Fire Alarm, Sprinkler Notification and Auxiliary Alarm	47½ " "
With Watch, Watch Supervision and Sprinkler Notification	47½ " "
With Automatic Fire Alarm and Sprinkler Notification	45 " "
With Automatic Fire Alarm, Watch and Watch Supervision	45 " "
With Watch, Sprinkler Notification and Auxiliary Alarm	45 " "
With Watch and Watch Supervision	42½ " "
With Watch and Auxiliary Alarm	42½ " "
With Watch and Automatic Fire Alarm	42½ " "
With Watch and Sprinkler Notification	42½ " "
With Automatic Fire Alarm	40 " "
With Watch	40 " "
With Sprinkler Notification	35 " "

The following illustration is typical of the cost of insurance before and after sprinkling. This illustration is taken for a building which has about 35,000 sq. ft.:

Value of building	$ 53,000.00	
Value of contents	150,000.00	
5-year rate on building per $100 before sprinkling, $.36 per annum, which makes the insurance		190.80
Annual rate on contents, $1.15, which makes the cost of insurance of contents before sprinkling		1,725.00
Total cost of insurance per annum		$1,915.80

The cost of the installation of sprinklers would be approximately $1750, and the reduction in insurance premiums would be 40 percent. Forty percent of $1915.80 is $766.32. That is, an investment of $1750 would make a saving of $766.32 in insurance rates. If we charge 15 percent interest and depreciation on the investment, it still leaves a net profit of $503.82, by which the sprinkler installation would pay for itself in three and a half years.

It is to be noted that in the illustration given above the contents value is high compared with the cost of the building. In cases of buildings used largely for office purposes where the contents value is low, the installation of sprinklers will not, of course, prove as good an investment. But in any case the automatic sprinklers will yield a reasonable return through the reduction in insurance rates, besides giving protection against loss by fire.

APPENDIX X.

PROPOSED NEW LEGISLATION

PART 1.—PROPOSED ORDINANCE TO EXTEND THE BUILDING LIMITS.

Section twenty-seven of chapter forty-five of the Revised Ordinances of eighteen hundred and ninety-eight is hereby amended by striking out all of said section and substituting therefor the following:

Building Limits.

SECTION 27. The building limits referred to in section nine of chapter five hundred and fifty of the Acts of the year nineteen hundred and seven are established as follows: All of the city within the corporate limits.

Within said limits no structure shall be permitted to be built of third class construction, or with the external walls or roof of combustible material, except as set forth in sections nine and ten of chapter five hundred and fifty of the Acts of the year nineteen hundred and seven.

Every addition to any structure within said limits shall be of either first or second class construction as set forth in the building laws.

PART 2.—AN ACT TO RESTRICT THE FIRE HAZARD AND TO ESTABLISH FIRE LIMITS IN THE CITY OF BOSTON.

SECTION 1. The fire limits of the City of Boston shall include all property within a district bounded as follows:

Beginning at a point on Charles River Embankment opposite Berkeley Street, thence southerly along the line of Berkeley Street to the Boston & Albany Railroad, thence easterly along the line of said railroad to Broadway, thence southeasterly along the line of Broadway to Fort Point Channel, thence by said channel and by the Harbor line around the city to the Charles River dam, thence by the Charles River embankment to the point of beginning.

SECTION 2. The City Council of the City of Boston may, by ordinance from time to time, extend and define said fire limits and may establish other fire limits in any part of the city within which the provisions of this Act shall be enforced.

SECTION 3. Within fire limits as herein defined or as they may be from time to time extended, defined, or established as herein provided, every structure hereafter built and every addition hereafter made to any existing structure shall be of first-class construction throughout, as the same is defined in Chapter 550 of the Acts of 1907. This provision shall not apply to buildings erected by the United States Government or structures authorized by special act of the General Court of Massachusetts; nor to wharves; nor to buildings not exceeding 27 feet in height on wharves; nor to market sheds; nor to market buildings not exceeding such height; nor to temporary structures to facilitate the prosecution of any authorized work which may be erected under such conditions as the building commissioner may prescribe.

SECTION 4. Within said fire limits, all buildings existing at the time of the passage of this Act, which are of second or third class construction shall be equipped throughout with a sprinkler service, with two independent supplies from the street mains and with sprinkler head and piping, all installed in accordance with the usage and rules of the National Board of Fire Underwriters, except, however, that this provision shall apply to hotels and lodging houses only in basements, first stories, public halls and public rooms and shall not otherwise apply to buildings used only for habitation. In case of buildings used in part for habitation and in part for other purposes, the portions of said buildings so otherwise used shall be protected by sprinklers as herein provided.

The installation of said sprinkler services shall be complete so that the same shall be in operation in all buildings in which the same shall be required within two years from the date of the passage of this Act. After the expiration of that time, the building commissioner shall cause such building to be inspected, and if the

owner of any building shall be found to have neglected to comply with the provisions of this Act, the building commissioner shall forthwith, in writing, notify the owner, agent, or any person having an interest therein of such neglect, and the owner of any such building as shall not have been equipped as herein provided shall be liable for payment of a fine of $10 for each and every day after such notice until the building is so equipped; such fine to be collected by the City of Boston and to become a part of its general fund. If such neglect continues for 60 days after said notice, then the building commissioner shall forthwith affix in a conspicuous place upon the external walls of said building a notice that the owner has not complied with the requirements of this Act, and such last mentioned notice shall not be removed or defaced without his consent. The said commissioner may with the written approval of the mayor order any building, the owner of which shall have failed to comply with the provisions of this Act after the expiration of the said 60 days, to be vacated as dangerous and to remain vacant until such provisions have been carried out.

SECTION 5. Within the fire limits as herein described alterations of existing buildings of the second and third class shall be allowed only when the said alterations are not of a nature to increase the height of the building, or the fire hazard, and only when such alterations shall have been approved by the Fire Bureau.

SECTION 6. All acts or parts of acts inconsistent with the provisions of this Act are hereby repealed, in so far as they affect such provisions.

SECTION 7. This Act shall take effect upon its passage.

PART 3.—AN ACT TO ESTABLISH A FIRE BUREAU IN THE CITY OF BOSTON.

SECTION 1. There shall be established in the city of Boston a Board to be called the Fire Bureau, which shall consist of the Fire Commissioner, Building Commissioner and the Police Commissioner of said City, ex officiis, and four other members, citizens of Massachusetts, who shall be residents of or engaged in business in said City; to be appointed by the mayor in following manner:— One member from two candidates, one to be nominated by the Boston Chamber of Commerce, and one by the Boston Real Estate and Auction Board; one member from two candidates to be nominated by the Bar Association of the City of Boston; one member from two candidates, one to be nominated by the Boston Society of Architects, and one by the Boston Society of Civil Engineers; one member from two candidates, one to be nominated by the Master Builders' Association, and one by the Contractors' and Builders' Association. These appointments shall not be subject to confirmation by the Civil Service Commission. The appointments first made shall be for the terms of one, two, three and four years respectively, so that the term of one member shall expire each year. All subsequent appointments shall be for the term of four years. Vacancies shall be filled in the same manner in which the original appointments are made. The mayor shall designate, as Chairman of the Bureau, one of the four appointed members. The Chairman shall receive as salary the sum of $1,500 per annum and the other appointed members shall each be paid at the rate of $10 per day for actual service, but not more than $1,000 in any one year.

SECTION 2. The Bureau is authorized and directed at its discretion to employ such inspectors, assistants and clerks as it may deem necessary and, subject to the approval of the mayor, to fix the salaries to be paid therefor, to rent suitable premises and to incur expenses for traveling, printing and such other matters as shall be incidental to the work of the bureau. The expenses thus incurred as well as the compensation of the members of the bureau shall be paid by the city upon warrants signed by the Chairman.

SECTION 3. This Bureau shall have within the limits of the City of Boston all the authority and all the duties and shall be charged with all the responsibility of the State Fire Marshal as described in Sections 2-5 inclusive of Chapter 32 of the Revised Laws of Massachusetts and the jurisdiction of said Fire Marshal in said city of Boston shall cease with the passage of this Act.

This Bureau shall make a public report each year, stating the causes of all fires which shall have occurred in the city of Boston during the preceding year, giving the names of the per-

son or persons responsible therefor, which report shall be printed and distributed as a public document and shall from time to time report to the prosecuting attorney of Suffolk County any violations of law which it shall discover.

No material shall be removed and no repairs shall be made to a building damaged by fire until the Bureau has made its investigation of the premises or has given a definite permit in writing, permitting such removal or repairs.

Section 4. This Bureau shall examine all buildings for the erection or alteration of which permits shall be granted by the Building Department of the City of Boston and it shall be the duty of the Building Department to report to this Bureau all such permits when granted; and this Bureau shall issue a report as to the condition of said buildings, stating whether or not they conform in construction and equipment to the laws regulating such construction and equipment; and said Bureau shall have the power to forbid the issuance of permanent fire insurance policies on any such building and to order the cancellation of any policies of fire insurance which may have been placed on such building prior to such examination and report; provided, however, that nothing herein shall be construed to prevent the issuance of fire insurance on buildings in process of construction.

SECTION 5. This Bureau shall have power to make such rules or regulations as it shall deem necessary to lessen the fire hazard, to provide for the safety of occupants of buildings, to enforce proper care in handling and storing combustibles, and to prevent carelessness as far as it increases the fire risk. Any violation of the rules, regulations or decisions of the Bureau shall be punishable by fine or imprisonment of the party or parties responsible or by closure of the building affected, the recommendations of the Bureau being enforced in the same manner as is now provided for the recommendations of the state and local Boards of Health.

SECTION 6. All of the official acts and utterances of this Bureau shall be privileged.

SECTION 7. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed in so far as they affect such provisions.

SECTION 8. This Act shall take effect upon its passage.

APPENDIX XI.

SAVING IN INSURANCE RATES POSSIBLE AS RESULT OF INTRODUCTION OF HIGH PRESSURE SERVICE.

Boston Board of Fire Underwriters,
February 13, 1911.

MR. C. H. BLACKALL.

DEAR SIR: A meeting of the Executive Committee was held this morning. The Committee authorized me to say to you that they were unanimously in favor of making a reduction in the rates in the congested district of Boston, provided the high pressure fire service system, as proposed by the late City Engineer, Jackson, is installed. This reduction should amount to from $100,000 to $125,000.

Yours very sincerely,

F. E. CABOT,
Secretary.

APPENDIX XII.

FIRE FIGHTING APPARATUS AND FIRE DEPARTMENTS

To arrive at definite conclusions as to the condition of the Boston Fire Department, comparisons have been made with the departments of cities of about the same size. These comparisons are taken from data contained in the annual reports of the cities of St. Louis, Cleveland and Baltimore.

From the standpoint of equipment, we find that the Boston Department has more apparatus than any of the aforementioned cities, and that the apparatus is in good condition. The force available for fire service consists of 44 engine compnies, 27 ladder companies, 13 chemical companies, 3 towers and 3 fire-boats, a total of 90 companies, manned by a force of 992 men. St. Louis has but 64 companies with a force of 738; Baltimore, 56 companies with a force of 680; Cleveland, 48 companies with a force of 520. While the daily reports of the Boston Department show an enrollment of from 992 to 994 men, the force available for fire duty is not always up to standard, and companies very often report at fires without a sufficient number of men for effective service. This condition is likely to exist with frequency during meal hours and vacation periods. The following figures taken from the morning reports—August 15th, 1910, being a vacation period, December 16th, not a vacation period—show the force available for fire duty:

Date	Total Enrollment	Details, Days off and Vacations	Fire Force.
August 15, 1910.	992	405	587
December 16, 1910	994	330	664

The total number is further reduced during meal hours, so that from 6.00 a. m. to 9.15 p. m. every day, there is one-third of the force on leave, reducing the number of available men for fire duty on August 15th to 392, and on December 16th to 443. Under these conditions a very ordinary fire at the start often requires the sending in of a second and sometimes a third alarm, to get a sufficient number of men to properly handle the first alarm apparatus. While waiting for the second and third alarm companies to respond, valuable time is lost and the fire is very apt to make headway during the periods of waiting. To obviate this weakness in the Department, the Fire Commissioner has recently recommended the appointment of additional firemen so that the force may be adequate at all times. The Committee believes that this is a wise provision.

A feature which is likely to prove beneficial, not only to Boston, but to many of the surrounding cities and towns, is the development of a system of covering whereby the fire department of one

municipality can procure aid from an adjoining town. This system has not yet been put into effect over the entire metropolitan district, but the co-operation of the departments in the cities and towns contiguous to Boston has already been secured. Arrangements have been completed between Boston and several of the surrounding municipalities whereby, on first alarms, apparatus located near boundary lines crosses over into the other town in answer to alarms from border boxes. Boston has this arrangement with Somerville, Newton and Milton, and it is probable that Cambridge and Brookline will also adopt the plan.

The Boston Fire Signal Service, which establishes direct and instant knowledge of fire in any adjoining territory and by means of which apparatus can be summoned by a series of signals, extends at present to Cambridge, Newton, Brookline, Milton, Somerville and Chelsea; service from outside with Boston Fire Department houses is from Brookline, Cambridge, Milton and Somerville. It is the intention of the Boston Department to extend this branch of the service as rapidly as conditions will permit.

The fire alarm branch of the department, while not the most modern, is, nevertheless, efficient. The building where the headquarters is located, and in which the fire alarm branch is installed, is in a bad fire district, threatening the possible disablement of the system in case of conflagration there. The building is of fireproof construction and equipped with a water curtain, but there is considerable woodwork used inside the building which should be removed as far as it is practicable to do so.

The water supply in Boston is equal to that of any city in the country. It can deliver at a given point about 25,000 gallons a minute, an amount sufficient for fire fighting purposes under ordinary conditions. If the proposed high pressure system be installed as recommended by this Committee, substantially as embodied in Chapter 312 of the Acts of 1911, Boston will have one of the most efficient fire departments in the country.